

Early History

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EARLY FORESTS

Primal forests.—According to fossil records from coal beds, primeval forests of the South eons ago were complex forests of club moss trees and ferns (Burdette 1995). Since that time forest composition and distribution have changed in response to natural phenomena and later, to the influences of man. Over a long period of time primeval forests evolved from club mosses and ferns to gymnosperms, related to our present-day pines, and then later to mixed gymnosperm and angiosperm (deciduous) forests. During the glacial period, tree species migrated north and south and forest composition

changed as a result of climatic shifts (Burdette 1995). For example, about 20,000 years ago the northern boreal coniferous forest extended deep into the South.

Somewhere around 10,000 B.C., or perhaps before, the first humans immigrated to North America and into the South from across the Bering land bridge after the last glacier had receded to the north. Apparently they followed herds of large mammals such as mammoths, mastodons, giant bison, and ground sloths that they hunted and depended on for sustenance. In the South they found beech-maple hardwood forests. Over time,

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the forests, the archaic human inhabitants, and the faunal communities changed (Burdette 1995). By about 5,000 B.C. the climate had become warmer and drier, and oak-hickory and pine-hardwood forests had become dominate. The megafauna hunted earlier by the human inhabitants had become extinct and the people who had inhabited the South for thousands of years had switched to hunting deer, turkey, and small game animals. By 1,000 B.C. the Woodland people had developed simple agriculture and were cultivating plants, such as squash, for food. They influenced the landscape by the openings they created in the forests.

Later by about A.D. 1500, the Mississippian culture had developed extensive social, religious, and agricultural systems and fire was a common tool employed to influence forests (Burdette 1995). But for unknown reasons the culture declined.

Influence of Native Americans-1500s.—The first written records of early civilization and forests came from the Spanish explorers of the mid 1500s, such as De Soto. At that time developed cultures of Native Americans were widespread throughout the southern region; population estimates ranged up to 1.5 million natives (Cooper and Terrill 1990). They subsisted by hunting, growing crops, such as corn, beans, squash, and gourds, and gathering food and other materials (Burdette 1995). Their settlements tended to be located on better soils, but they certainly affected the drier uplands (D. Lay, pers. commun.). They used fire regularly without control to create openings in which to grow crops, to open the woods, and to drive game to facilitate harvest. Apparently substantial areas of the coastal plain were burned with high frequency and intensity, which favored pines in general and particularly longleaf pine. The burning in combination with soil conditions in some areas unsuitable for tree growth created extensive savannahs and grassland prairies. In upland mountainous areas, fires were not as frequent and hardwoods dominated. In moist bays, river floodplains, and swamps, fires usually did not occur and old-growth hardwood stands developed. It appears that the native groups moved periodically; and their influence and that of natural phenomena resulted in a wide variety of tree and forest age classes interspersed with ephemeral to longer-term openings throughout the region.

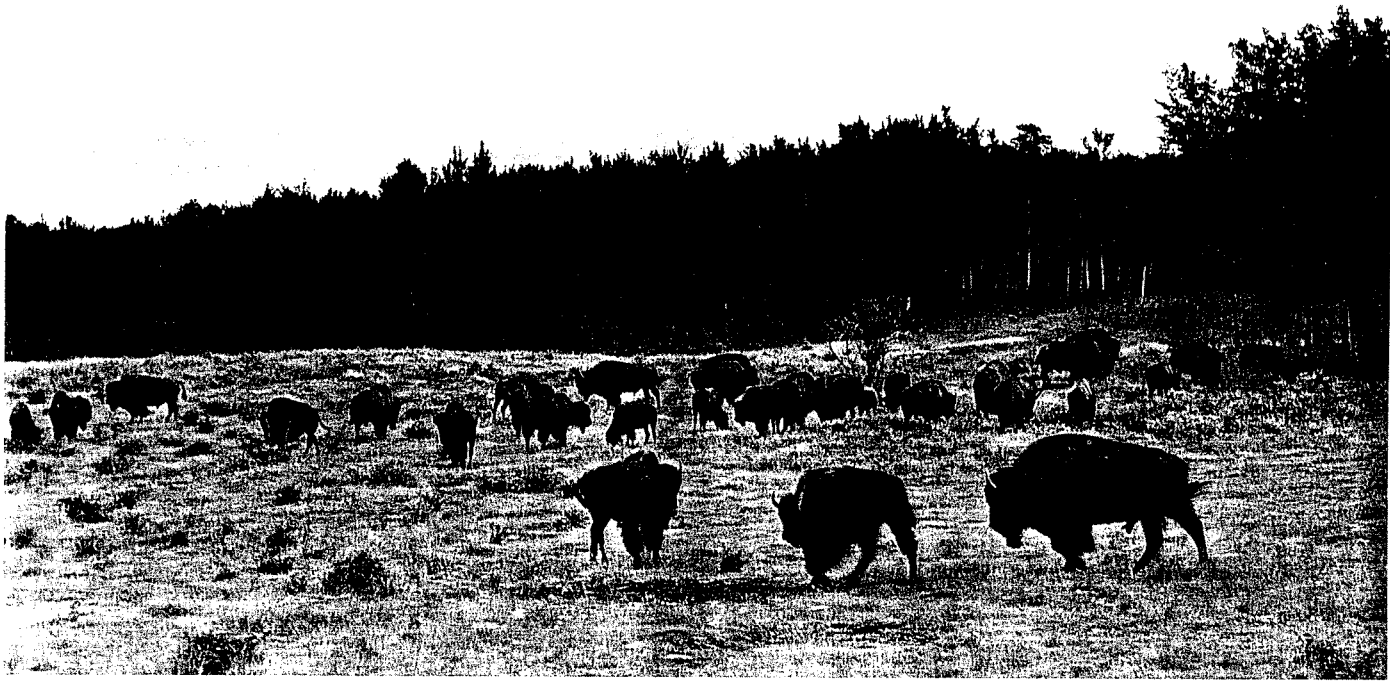
Old-growth forests-1700s.—But the extensive populations of natives encountered by the Spanish explorers of the mid 1500s were greatly diminished by the 1700s. Over half of the number of people detected earlier by the Spanish was gone by the time the next



Fire, flooding, ice and wind storms, insects, and diseases all have played a significant historic role in shaping southern forests and their fauna (US Forest Service).



Old-growth forests with structural diversity, large old trees, standing snags, and down decaying logs dominated the South in the 1700s before settlement by Europeans (J. Walker).



In pre-colonial southern forests there must have been openings and savannah-like habitat necessary for the herbaceous vegetation to support grazing animals and other species associated with early successional habitat.

explorers traversed the region and noted the condition of the forests and its inhabitants. Apparently the natives had little resistance to the diseases of the earliest Europeans and contact with them caused wholesale pestilence (Cooper and Terrill 1990). Native populations had been decimated, their effects on forests of the region had greatly diminished, and the forests of the region matured. Some areas, particularly hardwood bottoms, probably had not been influenced as much by earlier natives and were in an old-growth condition.

Accounts of early explorers of this era are quite variable and some should be taken with a grain of salt. But I believe we can piece together a reasonable picture of what southern pre-colonial forests of this time were like from records of early French and English explorers, such as William Bartram, an early naturalist who traveled extensively through the southeastern area in the late 1700s.

Pre-colonial old growth forests for the most part comprised a diverse landscape, with stands of varying tree ages interspersed with some openings (see Johnson 1987). In what would later become Alabama, Bartram (Van Doren 1928:318) described expansive savannahs, groves, dense cane thickets, swamps, and open pine

forests. There were many big, old trees, decayed trees, standing snags, down logs, and abundant mast produced in the mature forests. Characteristics of some remnant old-growth stands that remain were described by Wharton (1977) and Walker (1991).

The Blue Ridge, Ridge and Valley, Appalachian Plateau, and Piedmont provinces were characterized by mixed forests of mostly oaks and other hardwoods with some pines on drier sites. American Chestnut was common in the mountainous areas of the Appalachian region.

Coastal Plain forests were comprised of pine and hardwoods. Fire-resistant pines dominated on upland sites where fire was common. Some stands were described as dense and others as pine savannahs with grassy understories. Longleaf pine usually dominated sandy, infertile upland sites (Johnson 1987). But contrary to most early descriptions of diverse forests, several early travelers described monotonous pine "barrens" with little vegetative variety and a paucity of wildlife in places in the southeast (Johnson 1987). William Bartram noted the forest deserts of the Georgia/Florida area where birds were uncommon (Van Doren 1928). In the southern coastal plains, hardwoods,

especially oaks, were common on clayey soils. Hardwoods, particularly the shade-tolerant magnolia and beech, usually dominated on moist sites naturally excluded from fire (Delcourt and Delcourt 1974). Live oaks occupied higher ridges, which were archaic beaches, along the coast. In some areas in different regions soil conditions resulted in the development of natural prairies, which sometimes were a significant feature of the landscape.

Bottoms were occupied by oak-gum-cypress forests; particular stand composition dependent on specific site characteristics (Putnam et al. 1960). According to Bartram, about one-third of the Lower Coastal Plain of Georgia was gum-cypress or cane swamp (Johnson 1987). Other moist site forests, such as bays, pocosins, and wet prairies, occurred, particularly in the eastern portion of the region. Palmetto and cane were dominant understory species, sometimes forming extremely dense thickets. Apparently vast thickets of cane dominated ridges of southern bottoms. William Bartram made frequent reference to the thick cane in the Alabama region. President Theodore Roosevelt described cane in Louisiana so thick that human access could only be gained by cutting a path. And early settlers in East Texas noted the dense cane thickets.

Southern old-growth forests were not stable, but were dynamic, changing continually in response to numerous influences of natural phenomena and Native Americans. Natural plant succession continually affected plant communities over time; shade and competition-tolerant plants replaced intolerant pioneer species. Disturbance was a major determinant of forest composition. In the river bottoms, flooding and associated sedimentation were largely responsible for site characteristics and distribution of specific forest types and representative species. Also, insects, diseases, ice and wind storms, and fire all certainly played a role in shaping and changing the early old-growth forests. In summary, there were numerous forces affecting early forests and those forests were continually changing in response to those forces.

Fire played a major role in the composition of early southern forests. Although lightning fires were probably not very frequent because lightning usually was accompanied by rain in the South, the fires that started naturally burned unabated. Probably of much greater impact were the frequent fires set by Native Americans to create openings for crops, open up the forest, and drive game for harvest. Many native tribes used fire to drive deer for harvest (McCabe and McCabe 1984). Bartram made frequent reference in the late 1700s to the annual

firing of the forests by the natives in the Southeast (Van Doren 1928). The thick bark of older pines, particularly longleaf, afford some protection from heat from fire and are more resistant to damage and mortality from fire than hardwoods with thinner bark. Repeated burnings greatly reduced hardwoods on upland sites throughout large areas of the region and hardwoods persisted on moist, unburned sites. Old, large, shade-tolerant southern magnolia and American beech observed by Bartram in the late 1700s occurred on moist sites where fire was naturally excluded or was infrequent enough to allow the hardwoods to develop (Delcourt and Delcourt 1974).

From all indications forest openings and savannahs, such as open-grown mature longleaf stands, were a regular part of the southern forest landscape. William Bartram in his journey through the region saw many of several species of animals associated with early successional stands, such as the yellow-breasted chat and blue linnet (indigo bunting). Bison, a grazing animal, were widespread throughout the region at one time. Also, he reported a super abundance of white-tailed deer and wild turkeys, that depend on early successional vegetation during some phases of their life cycle, supporting the premise of abundant grass-forb and young brushy stands in early forests.

These forest openings and savannahs were a result of numerous factors (Johnson 1987). A variety of disturbances previously discussed set back succession and created openings. Natural fires and burning by Native Americans reduced woody vegetation and favored grass-forb vegetation. Also they created openings by girdling trees to clear land for their crops on more fertile sites. The rapid oxidation of organic matter of the "new ground" and rapid leaching of nutrients from most southern soils resulted in short term fertility and encouraged natives and early settlers to move their crop fields and settlements frequently.

WILDLIFE COMMUNITIES

Early records concerning wildlife of the pre-colonial era are certainly incomplete and therefore some conclusions are speculative. I believe, however, there is sufficient information from that era to draw some conclusions, regarding species of interest during that era, such as game species and large carnivores. These wildlife communities were determined by habitat, natural factors affecting populations, and substantial influence by Native Americans. The earliest time period with sufficient documentation to describe the pre-colonial wildlife communities was about the 1700s.

Large herbivores.—The early settlers readily utilized the great herds of bison that roamed throughout the region (for example, see Lowery's (1974:504) description of bison in Louisiana in the 1700s). Apparently there were sufficient prairies and grassy savannahs to support populations of bison and also elk that were encountered in some places by the new settlers (Van Doren 1928).

White-tailed deer.—According to early travelers white-tailed deer were widespread throughout North America except the arid southwest. Native Americans and later early settlers used them extensively for food, clothing, and for trade. Based on estimated Native American populations and diet, it was calculated that pre-colonial natives consumed an estimated 4.6 to 6.4 million deer annually in what is now the United States and Canada (McCabe and McCabe 1984).

Deer hides became the major trade item of the South. Numerous deer hides representing widespread hunting in Louisiana were sold by the Caddos to the fort at Natchitoches in the early 1700s (D. Lay, pers. commun.). Deer hides were the main export item from southeastern ports in the early to mid 1700s (Johnson

1987). For example in the mid 1700s, an average of about 150,000 deer hides per year were shipped from Charleston, South Carolina, and similar numbers were shipped from other coastal ports in the South (McCabe and McCabe 1984). The number of deer hides exported at that time, not including those used domestically, was several times the number of deer harvested in recent years (Johnson 1987). Apparently the combination of mature forests and openings or savannahs with browse and forbs created by fire or other disturbance was excellent habitat for this abundant herbivore.

Wild turkey.—There were very abundant wild turkeys in the diverse forests before white settlement. Based on early reports, Native Americans harvested wild turkeys with ease, and many tribes used them for food and adornments (Mosby and Handley 1943). Kenamer and Kenamer (1992) recount several descriptions of abundant turkeys in pre-colonial America. McCabe and McCabe (1984:29) reported that turkey remains were second in abundance to deer in eastern native refuse areas. Bartram described the spring gobbling at dawn near St. Augustine as a "universal shout" for hundreds of miles around from the



Several game species, such as white-tailed deer, wild turkey, and gray squirrels, thrived in pre-colonial forests (C. Miller).

turkey cocks roosting in cypress and magnolia trees (Van Doren 1928:89). Wild turkeys became a food staple for early colonists as they settled the area (Mosby and Handley 1943). The diverse forests with mature stands with hard mast as fall and winter habitat, and the openings with grass-forb vegetation and associated insects and other invertebrates as spring and summer habitat bode well for the wild turkey before exploitation by new settlers.

Squirrels.—Squirrels were abundant in pre-colonial forests. Bartram saw several color phases of fox and gray squirrels, and noted that flying squirrels were common (Van Doren 1928). Excellent gray squirrel habitat is comprised of large tracts of mature, mast producing trees with adequate dens in decayed wood (Huntley 1986); and gray squirrels probably thrived in most old growth forests before white settlement. Fox squirrels inhabit more open habitat and would have been favored in areas with pine- hardwoods, pine savannahs, openings, or agricultural crops.

Ducks.—The extensive area of mature flooded bottoms in the South with prolific acorn production and invertebrates in the oak litter was excellent winter habitat for wood ducks and mallards. They wintered by the millions in the flooded bottoms. Also, wood ducks probably were common nesters in the abundant cavities in the old-growth forests. Hooded mergansers, green-winged teal, gadwall, and American widgeon are other species of waterfowl that frequented flooded bottoms, particularly small openings, during winter.

Carnivores.—In general, large carnivores probably were abundant in pre-colonial forests where there was sufficient diversity and early successional vegetation to support prey populations. Bartram (Van Doren 1928:62) recorded numerous bears, tygers (cougar)- which preyed on calves and young colts, wolves (red wolf), and wild cats (bobcat). According to most early accounts cougars were widespread in pre-settlement forests (see Lowery 1974). In his journey from the Georgia to Alabama area, Bartram observed "tygers" regularly (Van Doren 1928). With hunting pressure they usually are intolerant of humans and have large home ranges. Cougars probably were supported by the abundant white-tailed deer. It is likely that bobcats were abundant where there was sufficient low vegetation to support adequate small mammal densities. They were sighted frequently by William Bartram in his journey through the southeast in the 1700s.

The red wolf seemed to be widespread in pre-colonial forests in the Coastal Plain and north along the Mississippi River delta (Lowery 1974, U.S. Fish and

Wildlife Service 1989). As with other species, apparently there was sufficient early successional vegetation to support herbivorous prey of the wolf.

Black bears were abundant in the diverse pre-colonial forests. The combination of mature forests with large trees, interspersed with openings, and little human interaction created ideal conditions for this large omnivore. Large trees provided dens, and important food, such as mast of American chestnut and oaks. Openings provided small vertebrate and invertebrate food, and abundant soft mast, such as blackberries. In the bottoms, bears often frequented the dense cane thickets, particularly when they were hunted (Roosevelt 1908, Van Doren 1928).

Small mammals.—Early naturalists had little interest in small mammals and records are minimal. Bartram saw 3 kinds of rabbits in his travels through the southeast (Van Doren 1928). An analysis of small mammal communities in 4 southeastern regions containing wilderness areas, revealed a small mammal community that was representative of the entire eastern United States (Schmidly 1986). The Appalachian region supported the highest diversity of species and was faunistically the most distinct, but the Florida/South Georgia region had the greatest number of endemic species.

Miscellaneous mammals.—In his travels in the late 1700s, Bartram noted otter, mink, weasel, pole cat (skunk), raccoons, and opossums in great abundance (Van Doren 1928:232). Hill (1986) reviewed species inhabiting wilderness areas; noting general biological characteristics. Species inhabiting hydric habitat included the mink, muskrat, river otter, and beaver. Species inhabiting mesic habitat in pre-colonial forests included the gray fox, red fox, striped skunk, spotted skunk, long-tailed weasel, opossum, and raccoon.

Red-cockaded woodpecker.—The red-cockaded woodpecker was probably widespread in pre-colonial forests where large pines dominated; found in what was to become New Jersey southwest through Kentucky and Tennessee, to southeastern Oklahoma and East Texas (Jackson 1971). Prime habitat consists of open-grown pine stands with old trees with red heart disease used for cavities, with limited hardwoods. In the northern periphery of its range where hardwoods dominated stands, it probably was never very abundant. In the southern coastal plain where fires limited hardwoods, woodpecker populations probably thrived. The species was considered common by John James Audubon in the monotonous pine barrens described by travelers in the early 1800s in Florida, Georgia, and South Carolina (Jackson 1971).

Bird communities.—Where old-growth forests were diverse with trees and stands of different ages, there were probably abundant and diverse breeding and wintering birds. Old, diverse forests with foliage in many different layers usually support a greater abundance and diversity of birds than simpler forests (Johnston and Odum 1956, Meyers and Johnson 1978, Dickson and Segelquist 1979). Bird abundance and diversity has been shown to be related to habitat patchiness (Roth 1976) and vertical foliage diversity (MacArthur and MacArthur 1961). In a series of forest stands of different ages in the South, the highest bird community values (more than 25 species and more than 2,500 territorial males per square mile) were found in mature pine-hardwood and mature hardwood stands (Dickson 1978a, Meyers and Johnson 1978).

Although it entails some speculation, reconstructing bird species in historic old-growth stands based on current data on birds in mature stands probably is reasonable. A variety of long-legged waders and the wood stork nest and forage in flooded forests. Avian predators, such as Mississippi and American swallow-tailed kites, bald eagles, osprey, red-shouldered hawks, and barred owls are regular occupants of mature bottoms now (Dickson 1988) and historically (Van Doren 1928). Vireos and warblers that frequent mature mesic forests now probably were abundant in historic forests. Red-eyed and yellow-throated vireos inhabit mature forest canopies, and white-eyed vireos are regular inhabitants of shrubby vegetation. Mature moist riparian forests consistently harbor several species of warblers, such as the black-and-white, prothonotary, Swainson's, worm-eating, northern parula, yellow throated, ovenbird, Louisiana waterthrush, Kentucky, and hooded warbler (Dickson et al. 1980, Hamel 1992). Swainson's warblers, and Bachman's warblers which now are extinct or close to extinction, were probably regular occupants of the dense cane thickets, which were widespread on higher ridges in the bottoms.

Early notes from Bartram (Van Doren 1928) detailed abundant Carolina parakeets in the North Carolina area, where he described them eating the seeds of cypress balls. They probably were very abundant elsewhere also. Passenger pigeon nesting colonies often covered miles of forests and they wintered in southern bottoms by the millions (Truett and Lay 1984), where they fed on the abundant oak mast. Bartram described wagon loads of pigeons killed by servants with lights at night.

Cavity nesting and using birds probably were abundant in early southern forests as has been documented



The red-cockaded woodpecker probably thrived in old-growth pine forests maintained by fire (US Forest Service).

in European forests (Tomialojc 1991). Old-growth forests contain numerous partially-decayed trees and snags used for nest sites by primary and secondary nesters, and abundant arthropod prey used for food. Truett and Lay (1984) noted from historical records, that cavity nesting birds, such as red-headed woodpeckers, American kestrels, and great crested flycatchers, were abundant in early forests of eastern Texas. In his trips through the southern bottoms in the early 1900s, Theodore Roosevelt (1908) regarded woodpeckers as characteristic species. The ivory-billed woodpecker once thrived in southern oak-gum forests where they foraged on recently dead trees (Tanner 1942). Wood ducks nested in the abundant natural cavities in the old-growth forests and prothonotary warblers were probably abundant in the bottoms where they nested in small cavities, often in trees and shrubs killed by flooding.

Although extent of habitat and populations were likely less abundant than today, bird species associated with early successional stands probably were regular

inhabitants of openings and open-grown savanna-like stands with abundant grass-forb and/or shrub vegetation. In his early travels, William Bartram made frequent reference to several species of birds associated with early successional habitat, such as the yellow-breasted chat and blue linnet (indigo bunting); and noted that he saw many more birds near habitations of men than in desert forests (Van Doren 1928). As best we can surmise, the distribution and abundance of other species associated with shrub or grass-forb vegetation probably were determined by extent of appropriate habitat in the diverse and ever-changing landscape.

Other species.—In the old-growth forests, game species associated with early successional stands, such as rabbits, mourning doves, and northern bobwhites were limited by the extent of appropriate habitat and probably were not very abundant. Early records of reptiles and amphibians were limited, although Bartram (Van Doren 1928) makes frequent reference to rattlesnakes and to numerous sightings of alligators.

SETTLEMENT AND EXPLOITATION

Colonization

The earliest European settlers had little effect on southern forests except where they settled along the Atlantic and Gulf Coasts (Burdette 1996a). However during the 1800s, America's population increased from about 5 to about 76 million people; and this growth was accompanied by greatly increased demands for natural resources. By 1819 all land east of the Mississippi River was claimed by the United States, and in the early 1800s pioneers were moving into the Southeast. There were conflicts with Native Americans from the initial colonial settlement of the eastern coast and as the colonists moved westward. Hostilities and wars resulted, and eventually most of the natives were evicted from the region by the U.S. Army along the "Trail of Tears" to Oklahoma.

White settlement increased greatly following the exodus of Native Americans from the region. New settlers were 95% rural (Burdette 1996a) and closely tied to the land. By 1860 New Orleans was the only city of over 150,000 people and by the turn of the century only about 20% of the southern populous lived in urban areas, compared to about half of the population nationwide (Cooper and Terrill 1990:332,505).

Early settlers regarded mature southern forests as wilderness to be conquered. Natural resources were considered inexhaustible and were exploited. The new

settlers cleared openings in the forest to plant their crops and provide pasture for their livestock. Corn was an important staple of Native Americans which was passed on to early European settlers. Corn became an important food of the large families of early settlers throughout the region. Also, it was raised to feed their horses and mules used to plow the ground for crops and to feed their cows, pigs, and chickens.

In the 1800s before the Civil War, major commercial crops of tobacco, rice, sugar cane, and to a lesser degree wheat and hemp, were developed and exported from the region (Cooper and Terrill 1990). Tobacco was an important crop in colonial Virginia, and later in Kentucky and parts of North Carolina and Tennessee. Rice was the dominant crop of coastal South Carolina and Georgia. Sugar cane was the main commercial crop of the French settlers on the fertile alluvial soils of southern Louisiana. But cotton was king. By 1860 cotton dominated the southern coastal plains, blackland prairies, and alluvial river bottoms from North Carolina to Texas. It was not dominant only in Florida, or the mountainous areas of the northern part of the region.

Wood from the forests was used to supply settlers' needs for other purposes. Wood was used extensively as fuel for heating and cooking and by the mid 1800s wood supplied more than 90 percent of the nation's heat energy, most of it for home use. Wood also was used for building houses and barns in the growing settlements. Southern timber was used for building ships before iron replaced wood as the main material. Another main product of the southern coastal plain forest in about a 125-mile longleaf-slash pine swath along the coast was turpentine and naval stores used early for waterproofing wooden ships and for various other products (Walker 1991).

Harvesting of forests during early white settlement was piecemeal and patchy, usually around settlements and along streams and rivers. By the mid 1800s, however, demand for wood from settlers was having a substantial effect on southern forests. Railroads were built throughout the region to carry passengers, and farm and forest products (Burdette 1996b). Wood was used in railroad construction; mainly crossties for which some 2,500 were required for each mile of track and replacement needed every few years (Burdette 1996b). And by the late 1850s a timber trade had developed in the region.

By the mid 1800s there developed real differences in philosophy between the southern states and the federal government over issues such as states' rights and slav-

ery, and in 1860 the Confederate States of the South seceded from the Union. The ravages of the Civil War from 1861 to 1865 placed heavy demands on the South's people and forest resources for fuel, equipment, supplies, and fortifications (Burdette 1996b). And after the war southern forests were tapped for products for post-war reconstruction.

During the 1800s a substantial lumber industry was developing in the nation. In this era vast landscapes were logged with no thought of reforestation before logging crews simply moved on to new areas of mature timber. Pines were an early commercial species due to their strength and light weight. The nation's early lumber industry was centered in Maine for about 200 years, but in the mid 1800s logging crews moved southerly and westerly as entire forests were eliminated (Brown and Bethel 1958:2). In the latter part of the 1800s the lumber industry moved from Maine, to New York, to Pennsylvania, then westward to the Lake States. And then, with the exhaustion of the mature forests to the north, wholesale logging moved to the flourishing forests of the South. The nation's total lumber production and that of southern pines peaked in 1909. Previously, the forests had been cut mainly to make way for the planting of crops, but then they were logged extensively for commercial products. For example, before settlement vast stately stands of longleaf pine covered some 74 million acres of the southern coastal plain (Frost 1993). But with extensive commercial logging advanced by new steam technology in logging and sawmilling virtually all of the mature longleaf forests were felled from about 1870 to 1920. After most of the mature forests in the South fell to the saw in the early 1900s, the logging crews headed west for the vast forests of large western conifers.

Also, hardwoods were in demand for a variety of products such as railroad ties and barn boards, and specialty products, such as hickory and ash for tool handles and hickory for vehicle wheels before they were made of metal. Cypress throughout the vast southern swamps was cut for shingles, boats, houses, water tanks, and other products in which the decay-resistant heartwood was needed. The commercial harvesting of hardwoods accompanied the industrial development of the nation during the nineteenth century (Brown and Bethel 1958:3). The center of hardwood logging moved from New England southerly and westerly, and then southerly down the Mississippi Valley and Appalachian Mountains.

And further losses befell the second-growth bottomland forests that regenerated. A particularly drastic

loss has been the conversion to other uses of the bottomland hardwoods of the Mississippi River Delta. The first land use data analyzed in the early 1930s showed there were approximately 11.8 million acres in bottomland hardwoods in the primary delta states of Louisiana, Arkansas, and Mississippi (Sternitzke 1976). But by the early 1970s Forest Service survey results showed only a little over half (7.2 million acres) of the original forested wetland remained in the Delta in the 3 states. The cleared bottomland forest was converted mainly to soybeans, and also improved pasture and cotton. Bottoms in the western gulf coastal plain have diminished also. According to the last Forest Service survey for East Texas (USDA Forest Service 1986) bottomland hardwood types occupy 14 percent of the timberland base, a decrease of 12 percent during the last 10 year period, continuing a long-term downward trend. The main causes for the decline were the development of man-made lakes, logging of mature stands, and shifts to cropland. Apparently, bottomland hardwood forests in the southeastern portion of the region have not suffered such extensive losses as elsewhere; wetland forest area has remained relatively consistent from the 1940s through the 1970s. Recently, some bottomland in the South has been planted to hardwoods under the Conservation Reserve Program.

In summary, southern forests supplied wood for houses and other products in the South, to the north which had been cut-over earlier, and in the developing midwestern plains where there were few forest resources. In the late 1800s and early 1900s southern forests were devastated by unrestricted logging. The forests were cut with little thought for forest regeneration, often soils were seriously depleted, and wildlife communities were threatened by the wholesale logging of the forests as well as unrestricted harvest of game animals.

Wildlife Demise

Early white settlers in the South were occupied with the basics of survival and had little regard or long-term perspective for husbanding natural resources. Generally, southern pre-colonial forests were regarded as wilderness to be conquered. Plants and animals were used for food and in other ways to support the colonists. Large carnivores were regarded as threats to livestock and personal safety, and as competitors to the early settlers for game animals. Wild animals were harvested the easiest way possible for food and also sold commercially. Also inherent in the settlers attitude toward the forest and its resources was the concept of free and open access and

use. The growing population of settlers and their demands on southern forest resources would take its toll on wildlife of the region. The story of a few high-profile species illustrate.

White-tailed deer were in high demand for their hides and for food, and Native Americans and later white settlers would take their toll. According to McCabe and McCabe (1984), historic deer populations nationwide went through 3 different stages and their history in the South probably was similar. From about 1500 to about 1800 as deer became the main item of sustenance and trade for Native Americans and European settlers, total estimated deer numbers were reduced by about 50%. With the expulsion of most of the natives from the area in the mid 1800s, deer populations recovered somewhat, but only temporarily. The period of greatest exploitation was the latter 1800s. Aggressive, prolific, white settlers invaded the region, and there was intense demand for deer for sustenance and for market. The repeating rifle facilitated the widespread harvest of deer and development of the railroad improved access through the region and transportation of deer for market. Although estimates are variable, by most accounts deer populations nationwide plummeted to less than a million animals by 1900 (McCabe and McCabe 1984).

A similar scenario was unfolding for the wild turkey. With expansive settlement, unrestricted harvest and market hunting, coupled with the widespread habitat degradation from wholesale logging in the 1800s and early 1900s, came the demise of the once-plentiful wild turkey. By 1920 the wild turkey had disappeared completely from 18 of the original 38 states it occupied nationwide and by the early 1940s it was reduced to about 28% of its original range, mostly in the South (Mosby and Handley 1943). In 1948, populations south-wide were estimated at about 100,000 (Mosby 1949). Remnant populations were relegated to remote tracts of mostly mature timber with limited human access and impact, such as the mountains of Appalachia; the Mississippi River bottoms of Louisiana, Mississippi, and Arkansas; and large land ownerships of southwestern Alabama, Georgia, and South Carolina.

The wood duck, a characteristic waterfowl species of southern bottoms, also experienced drastic reductions. By the beginning of this century they had been reduced to precariously low populations. They are vulnerable to the gun at roost sites at dusk and probably were decimated by overharvest.

Black bears, once numerous throughout the South, also were decimated. The new settlers' crops and free-

-ranging livestock were easy prey for bears during lean times, and bears were regarded as predators to be eliminated. Also they were used for food and lard for cooking, and in places bear hunting was a major activity of the men. Bear and humans and their activities often were in conflict, and bear population declines continued into the twentieth century. Distribution of bears in the region was reduced to only about 5 to 10% of their former range in the South (Maehr 1984). Viable populations were mostly relegated to relatively remote areas, such as the large tracts of federal land in the Appalachian Mountains and some southern bottomlands.

The passenger pigeon once nested throughout the forested United States and into Canada. Over a billion of these birds wintered in the southern bottoms where a main food item was the abundant oak mast (Truett and Lay 1984). The clearing of southern hardwood bottoms and the ease with which the communal birds were killed for market undoubtedly led to their demise. But the decline continued after market hunting ceased, perhaps due to their social reproductive behavior. The last passenger pigeon, named Martha, died at the Cincinnati Zoo in 1914 (Ehrlich et al 1992). The Carolina parakeet was another species that did not coexist well with the new colonial settlers in the south. In natural habitat they fed on fruits of native trees, such as cypress, and other plants. But with the opening of the forest they were attracted to the settlers' crops and gardens. Their crop depredations and unwary nature rendered them vulnerable to the settlers' gun (Truett and Lay 1984).

The ivory-billed woodpecker foraged in dead trees in mature bottomland hardwoods but also in upland mature forests. The last specimen was taken in a large mature bottomland forest near Tallula, Louisiana and a small population existed there until 1943 when the last of that mature forest was cleared to make way for soybeans (Lowery 1974). Since then there have been some unverified sightings in the United States, which were probably pileated woodpeckers. But a small remnant population has been reported in the mountains of Cuba.

The Bachman's warbler, a species associated with shrub-level vegetation, especially cane thickets in the bottoms, is extinct or nearly so, probably as a result of extensive clearing of the Mississippi River and West Gulf Coastal Plains bottoms. Although there have been occasional reports, the last confirmed sighting was in 1962 (Ehrlich et al. 1992).

Although documentation is minimal, other species probably experienced serious declines during this period of exploitation. Many shore birds as well as some of the large forest birds were harvested for food and sold

at market. Clearing of the bottoms likely eliminated substantial nesting areas of several colonial nesters. Also, many large colorful birds were harvested extensively for plumes for ladies' hats.

In this era the new settlers, mostly originally from Europe, expanded rapidly throughout the region. The forests and their associated wildlife were used by the

rapidly-growing population of settlers to meet their needs as they moved westerly, settled new areas, cleared new ground, and planted their crops throughout the South. They used whatever the land produced to survive and be productive. There was little provision for natural resources for the long term and those resources were substantially impacted.

